PRM29

COMPARISON OF DISCRETE DISCOUNTING AND NON-CONSTANT EXPONENTIAL DISCOUNTING APPROACHES TO CALCUATE FUTURE GAINS IN QUALITY-ADJUSTED LIFE-YEARS

Garg V[1], Raisch DW[2]
[1]University of New Mexico, Albuquerque, NM, USA, [2]University of New Mexico College of Pharmacy, Albuquerque, NM, USA

OBJECTIVES: Several large scale surveys conducted to measure time-preferences of people in various fields, other than those in the health outcomes, have shown that time-preferences follow non-constant exponential discounting. In pharmacoeconomic studies, however, all outcomes measures including quality-adjusted life-years (QALYs) use discrete discounting. Disability-adjusted life-years (DALYs) is an exception that is discounted using the non-constant exponential discounting approach. The objective of this study is to review the current literature on time-preferences specific to health outcomes and compare the differences between QALYs obtained through discrete discounting and non-constant exponential discounting approaches. **METHODS:** We searched PubMed and EconLit for methodological studies examining time-preferences specific to health outcomes. We projected gains of 0.1 QALY/person/year over 1 to 75 years in a hypothetical dataset of 1000 persons. We calculated differences in present values of QALYs obtained through discrete discounting and non-constant exponential discounting approaches, i.e. QALYs from discrete discounting subtracted by QALYs from non-constant exponential discounting, at discount rates of 1.5%, 3%, 5%, and 7%, from 1 to 75 years. **RESULTS:** We found no studies that examined discounting approaches specific to health outcomes. The differences in present values of QALYs, at 25, 50, and 75 years, respectively, were: 1) 0.28%, 0.55%, and 0.83%, using a 1.5% discount rate; 2) 1.1%, 2.2%, and 3.3%, using a 3% discount rate; 3) 3%, 5.9%, and 8.7%, using a 5% discount rate; and 4) 5.7%, 11.1%, and 16.1%, using a 7% discount rate. **CONCLUSIONS:** We found no published research comparing discrete discounting to non-constant exponential discounting approaches for QALYs. Over long time horizons, we found small but conceptually important differences between QALYs estimated by these approaches. Therefore, we recommend future studies to address time-preferences specific to determine if non-constant exponential discounting is relevant to health outcomes such as QALYs.

PRM30

A MODEL TO PREDICT RISK OF NON-ADHERENCE TO MEDICATIONS HIGHLIGHTED IN CMS STAR-RATINGS

Sulzicki M[1], Atkins D[2], Brooks L[3], Upadhyay A[3], Schilling C[4]
[1]OptumInsight, Life Sciences, Newport Beach, CA, USA, [2]OptumInsight, Edina, MN, USA, [3]OptumInsight, Life Sciences, Horsham, PA, USA, [4]OptumInsight, Life Sciences, Medina, MN, USA

OBJECTIVES: The Center for Medicaid and Medicare Services (CMS) has created plan Star ratings that indicate the quality of Medicare plans. In 2012, CMS added three pharmacy measures that focus on member medication adherence, i.e. oral diabetes medications, hypertension medication (ACEI or ARB), and cholesterol medication (statins). To proactively identify patients at risk for non-adherence, a multi-variate regression prediction model was developed to create individual persistency risk scores. **METHODS:** The predictive model is created using prescription drug and medical claims from a large managed care database. Medicare and commercially insured patients over age 55 from 2008-2010 who are new to the Star rating medication categories are included. Patients included in the model have a full 18 months of continuous enrollment in the health plan (6 month drug naïve period, 12 months of follow up). The predictors are created from the 6 month pre period and include: a) socio-economic factors; b) medical characteristics (e.g. Charlson Comorbidity Index); and c) drug characteristics (i.e. drug cost and past chronic drug adherence). **RESULTS:** Multivariable analysis of study outcomes will be conducted using appropriate regression models based on the distribution of the measure. A logistic regression model will be estimated (=1 for at least 80% PDC, =0 for non-compliance). Results of a logistic regression will be presented as odds ratios associated with each independent variable. The parameter estimates from the above econometric model will be retained and used to estimate the probability of non-compliance on a new set of patients. To test the accuracy of the predictive model, we will choose a random sample of patients new to these medications in 2011, as exhibited by the average PDC in each risk group (high, medium, low). **CONCLUSIONS:** An adherence predictive model can be useful to identify patients who may benefit from a drug adherence intervention program.

PRM31

EVALUATION OF DECISION ANALYTIC MODELS IN COST-EFFECTIVENESS ANALYSIS IN KOREA: FROM GUIDELINE TO PRACTICE

Bae S, Lee S, Lim SH
Health Insurance Review & Assessment Service, Seoul, South Korea

OBJECTIVES: Korea's Health Insurance Review and Assessment Service (HIRA) has been in charge of formulating economic evaluation guideline and evaluating submissions for reimbursement decision. The purpose of this study is to observe current practice patterns of using decision analytic models in submissions considered by HIRA. **METHODS:** Thirty-four dossiers were submitted by industry from January 2007 until December 2009, and they were evaluated by two independent researchers at HIRA. The adherence to current HIRA's recommendation was assessed. **RESULTS:** Out of 34 submissions, 23 applied model-based evaluations, and more than half (14) submissions were based on markov modeling. Dynamic models were not applied any of the submissions. Submissions frequently omitted the justification of the assumptions, definition of markov states or cycle length. Parameter search /selection criteria were rarely provided, and usually extrapolated in favor of the applicants. Transparency was lacking especially models with long time horizon and multiple assumptions, and submitted models were rarely validated. **CONCLUSIONS:** Decision analytic models are frequently applied in economic evaluation dossiers, yet the quality of provided models varied greatly. Revised HIRA's guideline could specify the minimum standard of modeling to increase the comparability of submitted dossiers.

PRM32

ONE DAY MONEY WILL ONLY BE SPENT ON EFFECTIVE DRUGS. . .FROM PAYERS' ASPIRATIONS TO PERFORMANCE-BASED RISK-SHARING OPERATIONS

Ethgen O
University of Liege, Liege, Belgium

OBJECTIVES: To define an operational modelling framework intended to help the design of Performance-Based Risk-Sharing (PBRS) schemes. A time-to-event endpoint is used as a performance criterion. Such survival endpoints are commonly used in clinical studies, notably in oncology where PBRS schemes are gaining momentum. **METHODS:** The framework is based on an open population model with a monthly cycle and 3-year time horizon from launch (i.e. when enrolment into the PBRS scheme starts). Entry into the model (i.e. the progressive arrival of new patients into the PBRS scheme) is determined by market diffusion assumptions and is modelled using a Logistic function. Exit from the model (i.e. patients experiencing the event or dying from any cause) is determined by survival curves from clinical/epidemiological studies and is modelled using a Weibull function. The model accommodates different treatment dosing schedules and performance levels (i.e. minimum survival times guaranteed). Multiple PBRS scenarios can be run and compared in terms of their operational and financial implications. Additionally, the effect of potential revisions of a PBRS scheme terms and conditions can also be examined as real-life information becomes available following scheme implementation (i.e. Bayesian updating). **RESULTS:** For example, assuming 1,000 patients enrolled in a PBRS scheme, with a monthly dosing schedule and given diffusion (Logistic α=5.0; β=0.4) and survival (Weibull λ=0.7; k=27.0) assumptions, the model predicts that 1937 (6970), 4050 (7861) and 9282 (4420) doses will be given to non-responding (responding) patients with 12, 18 and 24 months minimum survival time guaranteed scenarios, respectively. **CONCLUSIONS:** This framework provides both payer and manufacturer with valuable insight into the operational and financial dimensions of the potential PBRS schemes they may contemplate as they negotiate patient access conditions. Both parties can better anticipate the implications of the schemes and better plan resources, logistics and financial arrangements accordingly.

PRM33

VALIDATING A WEB-BASED, INCREMENTAL COST-EFFECTIVENESS SOFTWARE PROGRAM THAT IMPLEMENTS A MARKOV CHAIN MONTE CARLO (MCMC) ANALYSIS MODEL

McGhan WF, Khole T, Vichaichanakul K, Willey VJ
University of the Sciences, Philadelphia, Philadelphia, PA, USA

OBJECTIVES: To evaluate a web-based software program which incorporates Markov Chain Monte Carlo (MCMC) analysis to compare the cost-effectiveness of any two treatments, allowing modifiable inputs of key variables. **METHODS:** A web-based software program was developed, which incorporates Markov Chain Monte Carlo (MCMC) analysis to compare the cost-effectiveness of any two treatments. The online software program was based on calculation methods described in "Decision Making in Health and Medicine" textbook from Hunink et al. The MCMC web-based program computes and graphically displays the results, using JavaScript algorithms and is available as freeware at www.healthstrategy.com. We compared the online results with analyses using Decision Maker software available from UMDNJ.edu. The variable inputs that can be modified in the web-based application include: state transition probabilities, number of patients, number of cycles, cost per state, and utility per state. **RESULTS:** The web-based tool creates plots of incremental costs versus incremental utilities, in cost-effectiveness quadrants; and if death is the absorbing state, also graphs life expectancy curves for two treatment comparisons. As an example of the similarity of findings, when considering three transition states per treatment, the online software versus the Decision Maker model results were as follows: treatment cost (means: $1417 vs. $1300 and standard deviations: 1706 vs. 1604); treatment effectiveness (means: 7.6 vs. 7.8 and standard deviations: 7.2 vs. 7.0). **CONCLUSIONS:** With this online MCMC program, the user can input their own therapy parameters, and then generate key means and standard deviations, incremental costs, incremental utilities, life expectancy curves, and incremental cost effectiveness ratios. MCMC has advantages over Markov cohort analyses because means and standard deviations can be generated from the MCMC calculations. This web-based application has potential benefit as a basic educational tool for students and health professionals interested in exploring these analytical approaches.

PRM34

ESTIMATING MARKOV CHAIN TRANSITION MATRICES IN LIMITED DATA SAMPLES: A MONTE CARLO EXPERIMENT

Tsang KP[1], Wang BCM[2], Garrison L[3]
[1]Virginia Tech, Blacksburg, VA, USA, [2]Adjility Health, New York, NY, USA, [3]University of Washington Department of Pharmacy, Seattle, WA, USA

OBJECTIVES: Markov models are often used in Health Economics to represent disease progression in Cost-Utility models. The transition probabilities, however, may be difficult to populate when the data are limited. This note applies the Markov matrix approximation method using vector autoregression (VAR) to estimate the transition matrix when the sample size is small. **METHODS:** We compare the performance of the standard (count) method versus the VAR method to estimate transition probabilities in small samples. For the count method, one counts the

transitions from state to any other state in the data and then divides the counts by the number of occurrences for each . The VAR method follows Tauchen (1986) and Terry and Knotek (2011). We compare the two methods using Monte Carlo simulations by generating small samples from different data generating processes (DGPs) and comparing the mean squared errors made by each method versus the true transition matrix. We employ two DGPs to populate the entries of our underlying transition probability matrices in our study: 1) A normal distribution with large variance (DPG1), and 2) a uniform distribution with small variance (DGP2). We then normalize each row so they sum to 1. **RESULTS:** In DGP1, the VAR outperforms the count method in small samples (N = 10 or 30) and the count method marginally outperforms the VAR method in the large sample (N = 50). For DGP2, VAR outperforms in small samples and both methods perform similarly in the large sample. We propose a combination of the two methods by increasing the weight on the count method when the sample size increases relative to the size of the matrix. **CONCLUSIONS:** By applying this methodology in Health Economics modeling, it allows the researcher to utilize Markov models in situations previously infeasible due to a paucity of data.

RESEARCH ON METHODS – Patient-Reported Outcomes Studies

PRM35
EMPIRICAL EXAMINATION OF STARTING POINT BIAS WITH THE BIDDING GAME IN A WILLINGNESS-TO-PAY ANALYSIS

Iskedjian M[1], Mclean A[2], Berbari J[3], Farah B[3], Watson JA[4], Walker JH[5], Gafni A[6], Lelorier J[1]
[1]*Université de Montréal, Montréal, QC, Canada,* [2]*Unither Biotech Inc., Magog, QC, Canada,* [3]*PharmIdeas Research and Consulting, Ottawa, ON, Canada,* [4]*United Therapeutics Corporation, Research Triangle Park, NC, USA,* [5]*PharmIdeas Research and Consulting, Oakville, ON, Canada,* [6]*McMaster University, Hamilton, ON, Canada*

OBJECTIVES: Willingness-to-pay (WTP) analysis is a method for the monetization of a population's preference for a particular medication and may be determined using a bidding game where participants are asked if they would be willing to pay a particular amount, starting with a pre-determined value and oscillating between a series of new WTP amounts based on their previous answer. Starting point bias has been previously reported in the literature. The objective of the present study was to ascertain if any bias was introduced by applying higher or lower starting values to a bidding game. **METHODS:** An online survey was presented to members of the general public in Ontario, Canada, who were presented with two treatment delivery options (inhaler vs. injection) for a treatment of pulmonary arterial hypertension. Participants who selected the inhaler were randomly assigned a starting value (CAD$1, $2 or $5) and were asked to identify their WTP in terms of additional monthly insurance premiums. The minimum and maximum bidding game values were set at CAD$0.01 and CAD$50.00; participants who agreed to pay CAD$50.00 were allowed to input a higher WTP explicitly, as desired. The Kruskall-Wallis non-parametric test was applied to explore the differences in mean WTP associated with each starting value. **RESULTS:** Eighty-six participants reported a mean WTP of CAD$43.15 for the inhaler in additional monthly insurance premium. The mean WTP were CAD$37.55, CAD$49.36 and CAD$40.31 for participants who were assigned to a starting point of CAD$1, $2 or $5, respectively. No significant difference in WTP values was observed between the groups. **CONCLUSIONS:** The starting value did not appear to introduce a bias in the bidding game.

PRM36
INTERNATIONAL COMPARISONS OF EQ-5D HEALTH-STATES VALUATIONS

Garcia-Molina M[1], Chicaiza L[2], Rincon CJ[2], Romano G[2]
[1]*Universidad Nacional de Colombia, Bogotá, Colombia,* [2]*Universidad Nacional de Colombia, Bogota, Colombia*

OBJECTIVES: Different countries might have similar health preferences due to cultural or economic factors. The aim of this study is to identify whether there are groups of countries with similar health-state valuations. **METHODS:** A cluster analysis was performed for the 242 states of the EQ-5D valuations for 23 published studies in 18 countries. The perfect health state was not included. The Ward algorithm with the Euclidean measure and the hierarchical clustering technique were used in order to identify the optimal number of clusters and the clusters themselves. The features of the resulting clusters were studied and whether there were similarities in the countries belonging to the same cluster. The effect of the valuation methodology, Visual Analogue Scale (VAS) or Time Trade Off (TTO), was also taken into account. **RESULTS:** Five clusters were identified: 1) Germany-TTO, Netherlands-TTO, Denmark-TTO, Argentina-TTO, Poland-TTO; 2) Belgium-VAS, Europe-VAS, New Zealand-VAS, Spain-VAS, UK-VAS, Denmark-VAS, Germany-VAS, Slovenia-VAS; 3) Spain-TTO, UK-TTO; 4) Japan-TTO, USA-TTO, Zimbabwe-TTO, Hispanic USA-TTO, South Korea 2009-TTO, Finland-VAS, Argentina, VAS; and 5) South Korea 2008-TTO. Valuations are very sensitive to the preference elicitation methodology. Hence, valuations for a country may be more similar to the valuations of another country with the same methodology than to the same country with a different methodology. Countries in the same cluster tend to have cultural similarities (e.g. European countries with the same methodology tend to belong in the same cluster) but a particular cluster grouped otherwise dissimilar countries and methodologies: Japan-TTO, USA-TTO, Zimbabwe-TTO, and Argentina-VAS. **CONCLUSIONS:** Health-state valuations tend to be clustered in a few groups of countries that share cultural or economic features. These results can be used in sensitivity analyses when performing cost-utility analysis.

PRM37
A LITERATURE REVIEW OF EMPIRICAL STUDIES OF PROCESS UTILITY

Brennan VK[1], Dixon S[2]
[1]*RTI Health Solutions, Sheffield, South Yorkshire, UK,* [2]*The University of Sheffield, Sheffield, South Yorkshire, UK*

OBJECTIVES: Health economics research aims to maximise health gain within a given budget constraint, and is predominantly achieved through the maximisation of the quality-adjusted-life-year (QALY). Historically, the QALY assumes that individuals derive utility only from the consequences of processes and not from the processes themselves. This assumption of narrow consequentialism suggests health care consumers gain no benefit from the consumption of health, but that its value is determined exclusively through health outcomes. There is growing interest, however, in being able to differentiate between treatments with different processes, such as delivery methods, in quantitative terms. This study aimed to identify and review published empirical studies which include a measure of process utility (PU) which could be incorporated into the QALY calculation. **METHODS:** A literature review was performed in Medline using the search term "process utility". Additional searches were performed to identify studies not using this specific term, for example: "treatment-related attributes" AND (utilities OR "utility measurement"). **RESULTS:** Fifteen studies were identified. A variety of approaches were used to detect and measure PU: 4 studies used standard-gamble techniques; 5 studies used time-trade-off techniques; 2 studies used conjoint analysis; 1 study used SF-36 data; 3 studies used waiting-trade-off techniques. Eight studies evaluated treatments: 5 in diabetes and the remainder in gallstone disease, HIV and pain treatments; 6 studies evaluated testing/screening procedures and 1 study evaluated preventative care. All studies identified the presence of PU. Utility decrements ranged from 0.03-0.14 for different drug delivery methods, and 0.0005-0.12 for different dosing strategies. **CONCLUSIONS:** Although there is no universally accepted methodology for the detection and measurement of PU, evidence to date does support its existence. The wide range in values and approaches suggests that standardisation of methods around the most valid approach is highly desirable. Without this type of consensus, comparability and validity of results will be limited.

PRM38
VALIDATION OF NEW MEASURES OF PATIENTS' POST-TRANSPLANT EXPERIENCE IN THE PATIENTSLIKEME® ORGAN TRANSPLANT COMMUNITY

Massagli MP[1], Gnanasakthy A[2], Wicks P[1]
[1]*PatientsLikeMe, Cambridge, MA, USA,* [2]*Novartis Pharmaceuticals Corporation, East Hanover, NJ, USA*

OBJECTIVES: To study post-transplant experience of disease and treatment among members of the free online PatientsLikeMe® Organ Transplant Community. **METHODS:** A review of the literature, existing questionnaires, and analysis of discussions between transplant recipients on the website PatientsLikeMe.com was used to generate items for a survey in patients' own voice. Cognitive debriefing (n=7) was used to refine the items. Including patient and treatment characteristics the resulting online questionnaire contained 170 items informing 17 dimensions of patient experience. We surveyed patients in the US who had received a single organ. **RESULTS:** Twenty-eight percent of current, sampled members responded (n = 116, median completion time = 22 minutes). The sample was 63% female, 72% aged 45 or older, 77% non-Hispanic white, 41% college graduate, 62% kidney recipients, 70% transplanted 2 or more years ago. There were no significant differences between respondents and non-respondents. Over 40% of respondents rated their health as "very good" or "excellent"; over 60% rated their life since transplant as "better than expected". On average, 7 symptoms (of 41) were reported as at least "moderately bothersome" in the past 4 weeks. More symptoms correlated with worse experience of physical, mental, emotional, and social functions and relations with the health care team. Patients with more symptoms also reported poorer immunosuppressant adherence ($F_{4,125}=2.66$, $p = 0.036$). Regression analysis showed that disease-specific impact and physical limitation were most important to overall status. Analysis of variance showed the scales varied in sensitivity to reported group differences in overall health, perceived adherence, and comparison of current situation with what the patient expected. Reliability was above .79 for 15 of 18 scales. Scale correlations were moderate. **CONCLUSIONS:** Using the PatientsLikeMe online Organ Transplantation community questions were adapted from existing PRO measures and new questions were developed to measure both generic and condition-specific experiences important to post-transplant patients.

PRM39
EXAMINATION OF STARTING POINT BIAS WITH THE BIDDING GAME: EVIDENCE FROM A SYSTEMATIC REVIEW OF THE LITERATURE ON WILLINGNESS-TO-PAY ANALYSES

Iskedjian M[1], Navarro V[2], Berbari J[3], Lelorier J[1]
[1]*Université de Montréal, Montréal, QC, Canada,* [2]*PharmIdeas Europe SAS, Lyon, France,* [3]*PharmIdeas Research and Consulting, Ottawa, ON, Canada*

OBJECTIVES: Starting point (SP) bias has been reported in some willingness-to-pay (WTP) analyses using a bidding game (BG) approach. The objective of the present study was to systematically review WTP analyses which used more than one SP to ascertain if any bias was observed. **METHODS:** Using OVID MEDLINE® for 1996-2011 and the keywords [Bidding AND (Willingness to pay OR Willingness-to-pay OR WTP)], two reviewers independently identified and examined WTP analyses which applied more than one SP to a BG approach and which discussed any associated bias. Additional publications were also extracted from the references of relevant articles. Any discrepancy between the two reviewers was resolved through consensus. **RESULTS:** From 51 articles yielded by the literature search, 12 met the inclusion criteria and a further 5 were classified as secondary evidence (publications reporting on SP bias without presenting numerical data). Relevant publica-